

Listing of the Claims

1. (Original) A method for generating training data (D_T) for an automatic speech recogniser (2) for operating at a particular first sampling frequency (f_H), comprising the following steps:
 - deriving spectral characteristics (S_L) from audio data (D_L) sampled at a second frequency (f_L) lower than the first sampling frequency (f_H);
 - extending the bandwidth of the spectral characteristics (S_L) by retrieving bandwidth extending information (I_{BE}) from a codebook (6);
 - processing the bandwidth extended spectral characteristics (S_{LE}) to give the required training data (D_T).
2. (Original) A method according to claim 1, where the conversion of audio data (D_H , D_L) into sets of spectral characteristics (S_H , S_L) comprises calculating the FFT of the audio data (D_H , D_L) to give a set of Fourier coefficients (31) and filtering the output of the FFT with a filterbank (22) to give a set of filterbank power values (32).
3. (Original) A method according to claim 2, where the conversion of audio data (D_H , D_L) into sets of spectral characteristics (S_H , S_L) comprises processing the FFT coefficients (31) or the filterbank power values (32) to give a set of log-spectral coefficients (33).
4. (Previously Presented) A method according to claim 1, where the processing of bandwidth extended spectral characteristics ($S_{L,E}$) comprises a step of altering the spectrum to adjust signal properties of the audio data (D_L).
5. (Original) A method according to claim 4, where the step of altering the spectrum to adjust the signal properties of the audio data (D_L) is performed in the linear domain.
6. (Previously Presented) A method according to claim 1, where the derivation of the spectral characteristics (S_L) from audio data (D_L) is followed by a step subtracting the mean spectrum from the spectral characteristics (S_L).

7. (Previously Presented) A method for training an automatic speech recognition system (2) wherein the data (D_T) used for training are at least partially generated using a method according to claim 1.

8. (Withdrawn) A method for generating a codebook (6) for extending the bandwidth of spectral characteristics (S_L) for audio data (D_L) sampled at a second sampling frequency (f_L) to spectral characteristics (S_H) for a first sampling frequency (f_H) higher than the second sampling frequency (f_L), comprising the following steps for each entry of the codebook (6):

- deriving a first set of spectral characteristics (SC_H) from audio data (DC_H) sampled at the first sampling frequency (f_H);
- performing a sampling rate transformation on the audio data (DC_H) to the second sampling frequency (f_L) and deriving a corresponding second set of spectral characteristics (SC_L);
- generating a codebook entry (12) based on the second set of spectral characteristics (SC_L) and augmenting the codebook entry (12) with additional higher frequency information from the first set of spectral characteristics (SC_H).

9. (Withdrawn) A method according to claim 8, where augmenting the codebook entry (12) comprises extracting information from the corresponding first set of spectral characteristics (S_H) pertaining to the frequencies above the second sampling frequency (f_L) and attaching this information to the codebook entry (12) in the codebook (6).

10. (Withdrawn) A method according to claim 8, where the derivation of the second set of spectral characteristics (SC_L) is followed by a background noise reduction and/or channel normalization step.

11. (Withdrawn) A method according to claim 10, where the spectral characteristics (SC_L) comprise a log-spectral representation, and the channel normalization is performed by subtracting the mean log spectrum from the log spectral characteristics (SC_L).

12. (Withdrawn) A method according to claim 10, where the spectral characteristics (SC_L) comprise a linear spectral representation, and the background noise reduction is performed by subtracting a background noise spectrum from the linear spectral characteristics (SC_L).
13. (Withdrawn) A method according to claim 11, where the background noise reduction is performed by subtracting a background noise spectrum from a linear spectral characteristics (SC_L) subsequently calculating the logarithm and then subtracting the mean log spectrum from the log spectral characteristics
14. (Original) A system (1) for generating training data (D_T) for an automatic speech recogniser (2) operating at a particular first sampling frequency (f_H), comprising:
- a converter (3) for deriving spectral characteristics (S_L) from audio data (D_C) sampled at a second frequency (f_L) lower than the first sampling frequency (f_H);
 - a retrieval unit (4) for retrieving bandwidth extending information for the spectral characteristics (S_L) from a codebook (6);
 - a processing module (7) for processing the bandwidth-extended spectral characteristics ($S_{L,E}$) to give the required training data (D_T).
15. (Withdrawn) A system (5) for generating a codebook (6) for extending the bandwidth of a set of spectral characteristics (S_L) for audio data (D_L) sampled at a second sampling frequency (f_L) to a set of spectral characteristics (S_H) for a first sampling frequency (f_H) higher than the second sampling frequency (f_L), comprising:
- a converter (9) for deriving a first set of spectral characteristics (SC_H) from audio data (DC_H) sampled at the first sampling frequency (f_H);
 - a module (10) for performing a sampling rate transformation on the audio data (DC_H) to the second sampling frequency (f_L) and for deriving a corresponding second set of spectral characteristics (SC_L) for the second sampling frequency (f_L);
 - a codebook entry generator (11) for generating an entry (12) for the codebook (6) based on a second set of spectral characteristics (SC_L) and for augmenting the

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codebook entry (12) with additional higher frequency information from the corresponding first set of spectral characteristics (SC_H);